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AUTHOR Barufaldi, James P.; And Others
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ABSTRACT

A number of studies in science education have indicated the general effectiveness of level one videodisc-based programs in improving student knowledge in the sciences. The purpose of the evaluation study was to ascertain the effectiveness of the videodisc-based elementary science program in selected K-6 grade classrooms as determined by the users of the program involved in pilot testing. Thirty-six school sites in Texas were selected to participate in the piloting of the program. The study was conducted to: (1) collect information about level one users' teaching experiences, their academic specializations, and their level of experience with various forms of technology; (2) describe classroom behaviors and perceptions of students and teachers and the ecology of the learning environment; (3) determine teachers' attitudes toward technology and state anxiety toward teaching of science; (4) describe the impact of the innovation on the needs and concerns of teachers; (5) identify students' attitudes toward science/technology and interest in science outside the classroom; and (6) identify students' science content knowledge and skill development base before and after the implementation of the videodisc-based science program. Student information was collected through the administration of interviews; assessment of science-related attitudes, skills, and content; and classroom observation and administration of assessments of concerns and anxiety toward science and technology. Results indicate that teacher attitudes toward technology became significantly more positive at the culmination of the pilot testing and teacher anxiety toward teaching science was significantly less intense at the culmination of the pilot testing. (KR)

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A PROFILE OF USERS OF A LEVEL ONE VIDEODISC-BASED ELEMENTARY SCHOOL SCIENCE PROGRAM

James P. Barufaldi
Lowell J. Bethel
Science Education Center

and

Gayle V. Davidson
Instructional Technology

The University of Texas at Austin
Austin, Texas 78712

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A paper presented at the Annual Meeting of the National Association for Research in Science Teaching, April 10, 1991, Lake Geneva, Wisconsin.

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Introduction

A number of studies in science education have indicated the general effectiveness of level one videodisc- based programs in improving student knowledge in the sciences (Sherwood, Hasselbring, & Marsh, 1990). The outcomes of these studies have been encouraging for students at the secondary school level; more research is needed especially at the elementary school level before the full potential of level one based videodisc technology can be realized. This evaluation study reports the effectiveness of a level one videodisc based program in elementary school science. The program is a level one videodisc based elementary school science program, K-6, that includes both videodiscs and printed materials. Visuals stored on the videodiscs are used by teachers to present multimedia science lessons to students. Level one use of the program enables teachers to deliver lessons and activities designed to provide students with learning opportunities in earth, life, and in the physical sciences.

Statement of Purpose

The purpose of the evaluation study was to ascertain the effectiveness of a level one videodisc-based elementary school science program in selected fourth grade classrooms in Texas as determined by the users of the program involved in the pilot testing. The study was conducted to:

- collect information about level one users' teaching experiences, their academic specializations and their level of experience with various forms of technology,
- describe classroom behaviors and perceptions of students and teachers and the ecology of the learning environment,
- determine teachers' attitudes toward technology and state anxiety toward the teaching of science,
- describe the impact of the innovation on the needs and concerns of teachers,
- identify students' attitudes toward science/technology and interest in science outside the classroom, and
- to identify students' science content knowledge and skill development base before and after the implementation of the videodisc-based science program.

Evaluation Design

This study is qualitative in nature, supplemented with quantitative information. Student information was collected through the administration of interviews, assessment of science-related attitudes, skills and content, and classroom observations. Information about the pilot teachers was collected through demographic surveys, interviews, classroom observations and administration of assessments of concerns and anxiety toward science and technology.

Pilot Sites

Thirty-six school sites in Texas were selected to participate in the piloting of the program. The selection of sites represented the varied geographic areas of Texas and was determined by the willingness of school district personnel to participate in the piloting of an innovative elementary school science program. The selected schools also represented the socioeconomic and ethnic diversity of Texas. The classrooms represented 12 different independent school districts, low, middle and high socioeconomic teaching environments, urban, suburban, and rural geographic areas, and involved approximately 1,000 students.

Instruments

The following instruments were used in the evaluation study: Demographic questionnaire, Teacher Attitudes about Technology, State Anxiety Scale--"How Do You Feel About Teaching Science?", Stages of Concern Questionnaire, Student Attitudes, and Science Content and Skills Test, a Teacher Interview Form, a Student Interview Form, and a Classroom Observation Form.

The Demographic Questionnaire. The instrument asked teachers to respond to their teaching experience, their academic degrees, their educational experience with science and technology, and the demographics of their respective schools and classrooms. There were also several questions asking the teachers to comment on their specific use of the Windows program such as "What are your personal/professional goals for Windows?" and "How will you use the Windows package?". The questionnaire was modified from several instruments (Smith, Savenye, & Davidson, 1988; Davidson & Savenye, 1989; Bethel, 1989). The instrument contains19 self-report items.

Teacher Attitudes About Technology. The instrument measured teachers' perceptions of using technology in the classroom. It was modified from an instrument used with preservice teachers to assess experience, attitudes and anxiety toward computers (Smith, Savenye, & Davidson, 1988; Davidson & Savenye, 1989). The instrument contains 16 self-report items such as "I feel confident that I can learn how to use videodisc technology." and "I think such technology is dehumanizing." The teachers agreed or disagreed to each item using a five-point Likert-type scale. The coefficient alphas of internal consistency for the instrument are .89 (preassessment) and .87 (postassessment).

State Anxiety Scale. Teacher's anxiety toward the teaching of science was measured by a modified version of Speilberger's State Trait Anxiety Inventory (STAI), Form X-1 (A-State), (Westerback & Roll, 1982; Barufaldi, 1982,1987). The heading of the scale was changed from "Self Evaluation Questionnaire" to "How Do You Feel About Teaching Science?". This scale of the instrument measures situational conditions or a transitory emotional state, which can be influenced by training. The scale contains 20 self report items (10 reversed and 10 nonreversed) such as "I feel secure.", "I feel frightened.", and "I feel self-confident." and respondents are asked to rate their intensity of feelings on a Likert-type scale, the higher score indicating a *lower* level of anxiety. Studies have reported coefficient alphas of internal consistency for the X form in a range of .82 to .92 (Spielberger, Gorsuch, & Lushene, 1970).

The Stages of Concern Questionnaire. In order to determine teachers' concerns about the innovative videodisc science program (Windows) and how concerns might change overtime through the use of Windows the Stages of Concern Questionnaire (SoCQ) was selected.

The Concerns-Based Adoption Model (CBAM) is a valuable conceptual framework which is used by those professionals responsible for implementing innovative (science) programs. It can be used in planning and delivering programs and in monitoring and facilitating teacher change and growth. This framework was developed at The University of Texas at Austin Research and Development Center for Teacher Education, and resulted from many years of research on change in schools and colleges. The CBAM provides an approach to the study of teacher change by focusing on the growth of individuals over time. It describes teachers as

they first begin and then gain experience with using the innovative Windows program.

A cornerstone of the model is Stages of Concern (SoCQ) (Hall, Rutherford, & George, 1979), a conceptualization of the way the concerns of individual teachers change as they become knowledgeable about and involved with new science content, programs (e.g., Windows), and educational practices in their schools.

Concern is defined as the feelings, attitudes, thoughts, ideas or reactions an individual has related to a new innovation. The work of Francis Fuller (1969) resulted in the labeling of self, task, impact concerns--the concerns of young teachers as they progressed from early preservice experiences to being experienced inservice teachers. Fuller's work is the foundation upon which CBAM research on Stages of Concern is built. This research resulted in the identification of seven Stages of Concern About the Innovation (Figure 1, Appendix B).

Stages of Concern (SoCQ) describes the kinds of concerns which the individual teacher may experience over time, related to the new program or innovation. The stages range from initial information and self concerns (Stages 0, 1, 2), where individuals would be expressing such things as, "What is this science program and how will I be affected by it?" to concerns related to task (Stage 3), "How can I make this new program work" to concerns for *impact* (Stages 4, 5, 6), "How will using this science program affect my students?" Teachers experience a variety of concerns at any one time; however, the degree of intensity of different concerns will vary depending on the teacher's knowledge and experience.

Therefore, teachers seldom have concerns at only one stage. Typically teachers who are not yet users of a science program or who are new to it will have concerns high on Stages 0, 1, and 2 (Figure 1). They are mainly concerned about gaining information (Stage 1) or about how using the science program will affect them personally (Stage 2). Stage 3 management concerns become higher and more intense as they begin to use the science program. Then, when teachers become experienced and skilled, the tendency is for concerns at Stages 4, 5, and 6 to become more intense with Stages 0, 1, 2, and 3 decreasing.

The Stages of Concern About the Innovation Questionnaire (SoCQ) is used to measure the seven Stages of Concern. This psychometrically

rigorous paper and pencil test is used for research and program evaluation. It contains a total of 35 questions and teachers indicate their degree of concern by responding on a Likert scale for each item. Percentile scores and a profile of concerns for the individual or for groups results from scoring the responses by computer program.

Student Attitudes. The instrument was constructed by the researchers for the purpose of ascertaining students' interest in science outside the classroom, students' attitudes about learning science in the classroom and students' attitudes about learning science via videodisc technology. The instrument contains 18 self report items. One subscale includes twelve items pertaining to attitudes toward science such as "I would like to belong to a science club." and "I get excited about new things in my science classroom." The other subscale includes six items focusing on attitudes toward learning science using technology such as "It is easy to learn science with a videodisc." and "It is more exciting to use science with a videodisc." The respondents are asked to rate each item on a five-point Likert-type scale. The coefficient alphas of internal consistency for this instrument are .87 (preassessment) and .88 (postassessment). The coefficient alphas of internal consistency for the 12-item subscale are .84 (preassessment) and .84 (postassessment); the coefficient alphas of internal consistency for the 6-item subscale are .79 (preassessment) and .81 (postassessment).

Science Content and Skills Test. A general science content and skills assessment instrument was developed to determine if exposure to the Windows science program would have a significant impact on the attainment of science content and science process skills.

Several items were selected from various science sources. It is specifically designed for fourth grade students and includes questions in life, physical and earth sciences. The instrument contains 20 multiple-choice items with two subsections. One subsection includes 14 items on science content; the other subsection includes 6 items dealing with science process skills. The coefficient alphas of internal consistency for this instrument are .69 (preassessment) and .70 (postassessment). The coefficient alphas of internal consistency for the 14 item section are .57 (preassessment) and .57 (postassessment). The coefficient alphas of

internal consistency for the 6 item section are .47 (preassessment) and .52 (postassessment).

The Teacher Interview Form. This form includes seven questions asked to ascertain teachers' perceptions of the program and how they believe it enhances science instruction and learning.

The Student Interview Form. This form includes six questions to ascertain students' perceptions of the program.

The Classroom Observation Form. This form was used by the researchers to describe the classroom learning environment and to document interactions during the teaching of the program.

Procedure

During the first week of implementation the teachers completed a demographic questionnaire and responded to three instruments: Teacher Attitudes about Technology, State Anxiety Scale--"How Do You Feel About Teaching Science?", and the Stages of Concern Questionnaire. The students involved in the pilot testing completed an attitude toward science and technology questionnaire and a general science content and skills assessment.

The teachers piloted the science program for approximately four months. During this period of time, 15 teachers were selected through a stratified randomization procedure for an indepth focus. Each teacher was interviewed and their classrooms observed by the researchers. Five students from each of the 15 classrooms were also randomly selected and interviewed to ascertain students' perceptions of the videodisc program. To determine the effectiveness of the videodisc program, the aforementioned assessments were also administered to the teachers and students upon the completion of the pilot testing.

Results

Classroom Observations, Interviews, and Demographics of Level One Users

The rooms were neat, clean, and cheerfully decorated. The students were heterogeneously grouped in four's or five's. The majority of teachers were female (91% of the 34 respondents) and within the age range of 30-49 (94%). Teachers were well prepared and professional. Students

were enthusiastic about using the videodisc with science, polite, and worked well in groups. Lesson interactions were observed at five minute intervals. The typical lesson events were sequenced as follows; statement of objective, review of previous lesson, view videodisc, discussion, view videodisc, discussion, and culmination. Most children appeared on task and attentive for most of the lesson. Children appeared to be most interested when viewing and briefly discussing the motion videos and completing the hands-on investigations.

Teacher Attitudes About Technology and State Anxiety Toward Teaching Science A one-group, pretest-posttest design was employed to ascertain teachers' perceptions of using technology in the classroom. The assessment instrument was administered at the beginning of the pilot period and at its conclusion. Means and standard deviations of pre-and post- instruments were computed; differences between means were analyzed by use of a t-test for correlated samples. The results of the analysis reveal that for the comparisons of means, the calculated t value
(t (20) = 4.60) was significant at the .01 level(Table 1). The results of the analysis revealed that for the comparisons of means for the teacher state anxiety toward teaching science, the calculated t value (t (16) = 3.79) was significant at the .01 level(Table 2). These results indicate that teacher attitudes toward technology became significantly more positive at the culmination of the pilot testing and teacher anxiety toward teaching science is significantly less intense at the culmination of the pilot testing.

TABLE 1
TEACHER ATTITUDES ABOUT TECHNOLOGY

Instrument	Mean	SD	n
Preassessment	61.74	10.29	31
Postassessment	65.40	9.26	27

Calculated t value (t (20) = 4.60) significant at the .01 level.

TABLE 2
TEACHER STATE ANXIETY TOWARD TEACHING SCIENCE

Instrument	Mean	SD	n
Preassessment	68.57	10.81	33
Postassessment	69.26	8.71	23

Calculated t value (t (16) = 3.79) significant at the .01 level.

Stages of Concern Questionnaire

The teachers' concerns profiles were derived by the Stages of Concern Questionnaire. The pre-science program profile is typical of "nonusers." The most intense teacher concerns prior to using the program were stage 0 Awareness. Stage 1 Information was second in intensity of concerns. Stage 5 Collaboration is somewhat intense suggesting that many of these teachers have some interest in working with other teachers. The typically high Stage 0 Awareness suggests that the teachers really knew little about the videodisc science program and generally were "unaware" of its content, methods, activities, etc. Along with this concern is generally a need for more information and this is confirmed with a review of the profile. This score on Stage 1 was considerably higher than Stage 2, suggesting that teachers were much more interested in science program information than they were concerned about themselves personally, as related to any training provided. A profile such as this typically suggests openness and readiness to learning new knowledge and skills without undue personal threat.

At the conclusion of the pilot testing, the questionnaire was administered a second time. Awareness and management concerns show a significant net reduction. Stage 5 Collaboration has significantly intensified indicating that teachers did indeed focus on working with other colleagues. This is not surprising because of the interest generated by the innovative videodisc and electronics equipment. The decrease in earlier stages and increase in a later stage is viewed as a positive and natural trend. As these later stages become more intense, teachers have had some experience using

their new science knowledge and skills in their classrooms with their students (Figure 2).

Student Attitudes Toward Science and Technology

A one-group pretest-posttest design was employed to ascertain students' interest in science outside the classroom, students' attitudes about learning science in the classroom, and students' attitudes about learning science via videodisc technology. Of the 18 items, 12 items are related to science and 6 items related to technology. The assessment instrument was administered at the beginning of the pilot period and again at its conclusion.

Means and standard deviations of pre-and posttests were computed; differences between means were analyzed by use of a t-test for correlated samples. T-tests were run comparing pre- and post- assessment means on student attitudes toward science and technology for the total group, female students, and male students. There were no significant differences between pre- and post- assessment means of student attitudes toward science and technology(Table 3).To determine if there were any significant differences between groups on the two subscales of science and technology, t-tests were calculated for the total group of students,
female students, and male students(Tables 4 & 5). Significant differences were found only on the 6-item subscale of technology for the total group of students ($t = 2.51$, $p. = <.05$) and for male students ($t = 2.26$, $p. <.05$). No significant differences were found between the means for the remaining groups. The results indicate a significant and positive attitude change for the total group of students and for male students toward technology at the culmination of the pilot testing.

TABLE 3
STUDENT ATTITUDES TOWARD SCIENCE AND TECHNOLOGY

Instrument	Total	Female	Male
Preassessment	66.62a	65.67	67.77
	13.07b	12.95	13.18
	895c	437*	420*
Postassessment	67.37	66.49	68.54
	13.03	2.95	13.54
	647	305*	305*

a - mean
b - standard deviation
c - sample size
Maximum possible score is 18
* subjects with complete data
No significant difference.

TABLE 4
STUDENT ATTITUDES TOWARD SCIENCE

Instrument	Total	Female	Male
Preassessment	44.04a	43.16	45.10
	9.55b	9.36	9.75
	895c	437*	420*
Postassessment	44.11	43.43	44.96
	9.24	8.68	9.53
	647	305*	305*

a - mean
b - standard deviation
c - sample size
Maximum possible score is 12
* subjects with complete data
No significant difference

TABLE 5
STUDENT ATTITUDE TOWARD TECHNOLOGY

Instrument	Total	Females	Males
Preassessment	22.57a	22.50	22.74
	5.28b	5.32	5.24
	895c	437*	420*
Postassessment	23.27	23.06	23.58
	5.45	5.38	5.33
	647	305*	305*

a - mean
b - standard deviation
c - sample size
Maximum possible score is 6
* subjects with complete data
Significant at the .05 level for total group.
Significant at the .05 level for males.

Science Content and Skills Achievement

A one-group pretest-posttest design was employed to ascertain the impact of the innovation on the acquisition of science knowledge and science process skills. Of the 20 questions, 14 items are science content and 6 items are skill-oriented. The assessment instrument was administered at the beginning of the pilot period and at the conclusion of piloting. Means and standard deviations of pre- and post-tests were computed; differences between means were analyzed by use of a t- test for correlated samples(Table 6). T-tests were calculated to compare preassessment and postassessment performance for overall achievement scores for the total group, female students, and male students. Significant differences were found for each group: total group of students ($t(685) = 5.65$), for female students ($t(333) = 4.16$), and for male students ($t(311) = 3.80$).

TABLE 6
ACHIEVEMENT ON OVERALL CONTENT/SKILLS ASSESSMENT

Instrument	Total	Female	Male
Preassessment	12.12 a	12.17	12.10
	3.54 b	3.42	3.72
	931 c	501	430
Postassessment	13.10	13.19	13.13
	3.46	3.31	3.56
	686	374	312

a - mean
b - standard deviation
c - sample size
Maximum possible score is 20
Significant at the .01 level.

To determine how students performed on each of the subsections (content and skills), t-tests were calculated for the total group of students, female students and male students. Significant differences were found for the comparison of content pre- and post-assessment subsection means for the total group of students (t (685) 5.41), for female students (t (333) = 4.08), and for male students (t(311) = 3.51) (Table 7).

TABLE 7
ACHIEVEMENT ON CONTENT ASSESSMENT SECTION

Instrument	Total	Female	Male
Preassessment	7.94 a	7.94	7.98
	2.57 b	2.50	2.40
	931 c	501	430
Postassessment	8.63	8.67	8.67
	2.49	2.40	2.59
	686	374	312

a - mean
b - standard deviation
c - sample size
Maximum possible score is 14
Significant at the .01 level.

Significant differences were also found for the total group of students for the skills subsection comparison of means ($t(685) = 4.11$), for the female students ($t(333) = 2.93$), and for the male students ($t(311) = 3.10$) (Table 8).

TABLE 8
ACHIEVEMENT ON SKILLS ASSESSMENT

Instrument	Total	Females	Males
Preassessment	4.17 a	4.23	4.12
	1.41 b	1.38	1.44
	931 c	531	430
Postassessment	4.46	4.52	4.45
	1.39	1.33	1.42
	686	374	312

a - mean
b - standard deviation
c - sample size
Maximum possible score is 6
Significant at the .01 level.

The results of the analysis reveal that for all comparisons of means, the calculated t values were significant at the .01 level. The mean scores on both the pretest and posttest for the overall assessment and both subsections are significantly different. These results indicate a significant increase in gain scores for the total group, as well as for male and female students.

Summary

The results indicate the following:

- The pilot teachers are experienced, enthusiastic and positive toward using the innovation and expressed a degree of hopefulness that videodisc-based science program would encourage interest in science and technology among their students.
- The majority of pilot teachers use the program supplemental to an existing elementary school science program.
- The students in the pilot classrooms demonstrated great interest in the videos that depicted motion and sound.
- The observations of classrooms indicated that most teachers employed the following instructional sequence: review/objectives, videodisc, discussion, videodisc, discussion, and culmination.
- While the pilot teachers initially exhibited a strong, positive attitude toward technology, their attitude continued to increase significantly at the culmination of the pilot testing.
- While the pilot teachers initially exhibited low anxiety toward the teaching of science, their anxiety decreased significantly at the culmination of the pilot testing.
- Initially the pilot teachers demonstrated a typical nonuser profile of an innovation (the videodisc program). Upon the culmination of the pilot testing, a shift occurred in their concerns indicating a move from the less intense, self concerns to more intense concerns of the impact of the innovation on their students.
- Initially all students demonstrated a positive attitude toward science and technology. Upon the culmination of the pilot testing, the total group and the male students showed a further increase in positive attitude toward technology.
- Upon the completion of the pilot testing, all students, both males and females, showed an increase in gain scores on the science content and skill assessment.

The purpose of the evaluation study was to ascertain the effectiveness of Windows as determined by the users of the program involved in the pilot testing of this level one videodisc based elementary science program in selected fourth grade classrooms. Data have supported the notion that the program is effective in the fourth grade pilot classrooms. Attitudes of both teachers and students in general improved, gain scores in science content and skills among students occurred, and anxiety toward teaching science decreased during the pilot testing.

Based on both qualitative and quantitative information, one may characterize the typical pilot teacher as very confident in teaching science, very comfortable in using new technologies, and receptive to implementing innovations into their respective classrooms. One may characterize the average student in the pilot program as cooperative, well-behaved, relatively focused, and enthusiastic toward the learning of science via Windows. Most students showed a continued positive attitude toward the use of technology in science instruction and improved performance in science content achievement and skill development.

While the results of the pilot test are extremely encouraging, one must be cautious about drawing generalizations and inferences about the impact of the level one videodisc-based elementary science program on users. This caution is due in part to the nature of the one group pretest-posttest design of this evaluation study and the nonrandomization of teacher selection for the pilot testing. It is spurious to infer a causal relationship between the program and the reported results due to the complex nature of the teaching-learning triad (the teacher, the learner, and the context).

The outcomes of the pilot test show promise that the videodisc based science program is effective in initiating positive changes among teachers and students. It is recommended that additional longitudinal studies be designed and conducted to further substantiate these important findings.

References

Barufaldi, J. P. (1982). An exploratory study: State anxiety and concerns about teaching elementary school science among teachers. Discovery. The University of Texas at Austin.

Barufaldi, J. P. (1987). Basic studies on science anxiety and concerns of inservice and preservice elementary school teachers. In Pamela Fraser-Abder, (ed.). Science Education Research in Latin America and the Caribbean, Trinidad: The University of the West Indies, pp. 55-58.

Davidson, G.V. & Savenye, W.C. (February, 1989). The relationship among learning styles and attitudes toward computers in a computer applications course. Paper presentation at the Annual Conference of the Association for Educational and Communications Technology, Anaheim, California.

Hall, G., Rutherford, W., & George, A. (1979). Measuring Stages of Concern About the Innovation: A Manual for Use of the SoC Questionnaire. Austin, Texas: Research and Development Center for Teacher of Education, The University of Texas.

Optical Data Corporation (1990). Windows on Science. Warren, New Jersey: Optical Data Corporation.

Sherwood, R. D., Hasselbring, T. S. , & Marsh, E. J. (April 10, 1990). An evaluative study of level one videodisc based chemistry program. A poster session presentation at the Annual Meeting of the National Association for Research in Science Teaching. Atlanta, Georgia.

Smith, P.L., Savenye, W.C., & Davidson, G.V. (1988). Computer Experience, Attitudes, and Anxiety Assessment.Instrument. Unpublished. Austin, Texas: The University of Texas.

Spielberger, C. D. , Gorsuch, R. L. , & Lushene, R. E. (1976). STAI Manual for the State-Trait Anxiety Inventory. Palo Alto, California: Consulting Psychologists Press.

Westerback, M. E. & Roll, D. (April 5, 1990). Basic studies on anxiety about teaching science in preservice elementary teachers. Paper presented at the 55th Annual Meeting of the National Association for Research in Science Teaching . Lake Geneva, Wisconsin.

FIGURE 1
STAGES OF CONCERN
ABOUT THE INNOVATION

0 *AWARENESS*: Little concern about or involvement with the innovation is indicated.

1 *INFORMATIONAL*: A general awareness of the innovation and interest in learning more detail about it is indicated. The person seems to be unworried about herself/himself in relation to the innovation. She/he is interested in substantive aspects of the innovation in a selfless manner such as general characteristics, effects, and requirements for use.

2 *PERSONAL*: Individual is uncertain about the demands of the innovation, her/his inadequacy to meet those demands, and her/his role with the innovation. This includes analysis of her/his role in relation to the reward structure of the organization, decision making, and consideration of potential conflicts with existing structures or personal commitment. Financial or status implications of the program for self and colleagues may also be reflected.

3 *MANAGEMENT*: Attention is focused on the processes and tasks of using the innovation and the best use of information and resources. Issues related to efficiency, organizing, managing, scheduling, and time demands are utmost.

4 *CONSEQUENCE*: Attention focuses on impact of the innovation on students in her/his immediate sphere of influence. The focus is on relevance of the innovation for students, evaluation of student outcomes, including performance and competencies, and changes needed to increase student outcomes.

5 *COLLABORATION*: The focus is on coordination and cooperation with others regarding use of the innovation.

6 *REFOCUSING*: The focus is on exploration of more universal benefits from the innovation, including the possibility of major changes or replacement with a more powerful alternative. Individual has definite ideas about alternatives to the proposed or existing form of the innovation.

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[2]Original concept from Hall, G. E., Wallace, R. C., Jr., & Dossett, W. A. *A developmental conceptualization of the adoption process within educational institutions*. Austin: Research and Development Center for Teacher Education, The University of Texas, 1973.

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FIGURE 2
PRE-POSTTEST STAGES OF CONCERN PROFILES

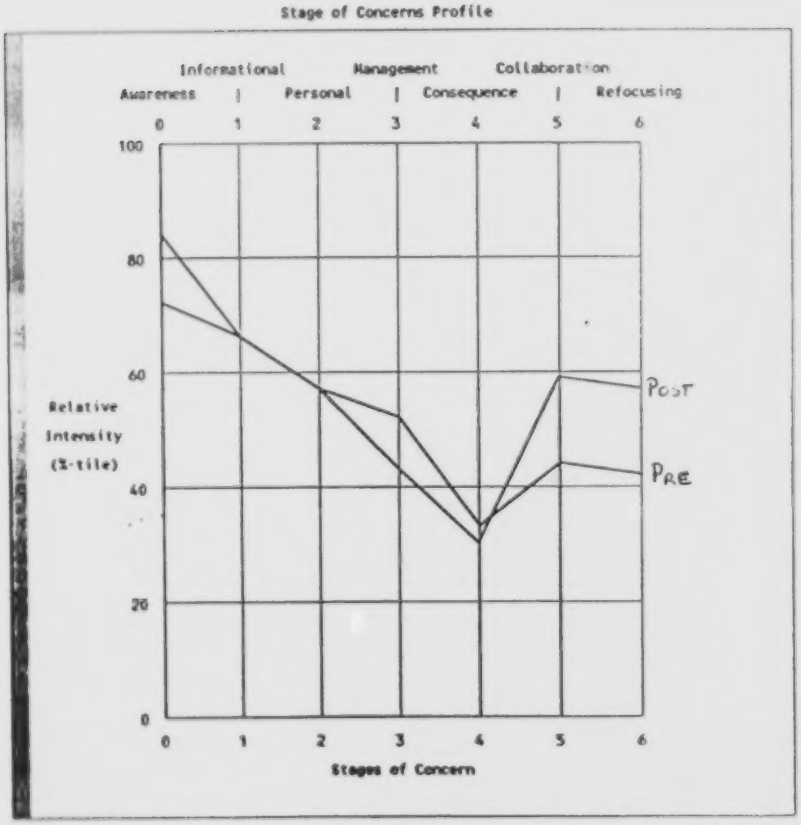
Stage of Concerns Questionnaire Scores

Group Profile N = 34

Innovation - Optical Windows

Stages	0	1	2	3	4	5	6
Group Frequencies							
Highest Stage	7	5	1	1	1	9	5
2nd Highest Stage	7	8	6	1	1	3	3
Group Scores							
Stage Scores	8	18	15	12	20	23	18
Percentile Scores	72	66	57	43	30	59	57

Stage of Concerns Profile



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